

CLAIMS

1. Axial thrust balancing system (10) for a centrifugal compressor (12), having improved safety characteristics, the said centrifugal compressor (12) comprising a rotor (14) having impellers (16) adjacent to each other and connected by a shaft (18), the said rotor (14) rotating in a stator (20), the said centrifugal compressor (12) including a balancing piston (22), a balancing line (24) being provided between an intake of a first compression stage and an area downstream of the balancing piston (22), characterized in that it comprises an intake mechanical gas seal (26) around the said shaft (18) upstream of the said first compression stage and an outlet mechanical gas seal (28) downstream of the said balancing piston (22), the said balancing line (24) being closable by means of blocking elements (32).
2. Balancing system (10) according to Claim 1, characterized in that the said mechanical gas seals (26, 28) are refilled with gas from a supply line (30).
3. Balancing system (10) according to Claim 1, characterized in that the said blocking elements (32) comprise a shut-off valve.
4. Balancing system (10) according to Claim 1, characterized in that the said outlet mechanical gas seal (28) is located at a delivery end of the said compressor (12) and has a function of balancing the said axial thrust.
5. Balancing system (10) according to Claim 1, characterized in that a direct-lubrication thrust bearing is used on the said shaft (18) to ensure the starting of the said centrifugal compressor (12).
6. Balancing system (10) according to Claim 1, characterized in that the said outlet gas seal (28) operates with a pressure on a primary ring equal to the delivery pressure of the said compressor (12).
7. Balancing system (10) according to Claim 1, characterized in that, in high-pressure applications of the said centrifugal compressor (12), the said outlet mechanical gas seal (28) is refilled with a supply of gas at high pressure.

8. Balancing system (10) according to Claim 7, characterized in that the said supply line (30) takes the gas from the delivery end of a diffuser of the final compression stage of the said centrifugal compressor (12), immediately upstream of a scroll, and, through pipes external to the said centrifugal compressor (12), sends it to a high-pressure filter.

9. Balancing system (10) according to Claim 8, characterized in that the said gas, taken from the said delivery end of the said diffuser of the said centrifugal compressor (12), is returned into the said centrifugal compressor (12) at the positions of end labyrinth seals of the said centrifugal compressor (12), at the positions of primary rings of the said mechanical gas seals (26, 28).

10. Balancing system (10) according to Claim 1, characterized in that uncertainties in the calculation of the pressures and in the specification of the diameters of the said mechanical gas seals (26, 28) can be compensated for by appropriate pressurization of the primary ring of the said outlet mechanical gas seal (28) and/or that of the said intake mechanical gas seal (26).

11. Balancing system (10) according to Claim 1, characterized in that the said balancing piston (22) is keyed on the said shaft (18) of the said centrifugal compressor (12), downstream of the final compression stage.

12. Axial thrust balancing system (10) for a centrifugal compressor (12), having improved safety characteristics, substantially as described and illustrated and for the specified purposes.